vena cava filter does not treat the underlying deep vein thrombosis and anticoagulation alone does not protect against pulmonary embolism in patients with a large volume of free-floating clot, both anticoagulation therapy and vena cava filter placement are indicated in some patients.

The stainless steel Greenfield filter, in use for about 15 years, has traditionally been placed by surgical cutdown. Over the last several years, percutaneous placement by interventional radiologists has been increasing in popularity. Also, four other vena cava filters are now available. All are designed for percutaneous placement under local anesthesia without a surgical cutdown. They are placed most often via the right common femoral vein, but not uncommonly via the right internal jugular vein. Alternate sites include the left common femoral vein and, for the Simon nitinol filter, the antecubital vein. The location of the renal veins and the diameter of the inferior vena cava are determined by venography before filter insertion.

The ideal vena cava filter should be a device that is easily and safely placed percutaneously, biocompatible, mechanically stable, and able to trap threatening emboli while not causing occlusion of the vena cava. With the stainless steel Greenfield filter, the rates of vena cava occlusion and of recurrent pulmonary embolism appear to be about 5%. When placed properly, this filter very rarely migrates. The outer diameter of the introducer sheath is 29.5 F, so the vein at the entry site must be dilated to about 10 mm to accommodate the introducer. The filter is ferromagnetic and can cause artifacts on magnetic resonance images, totally obscuring or distorting the appearance of adjacent structures in the spine, retroperitoneum, or abdomen.

Several vena cava filters recently have undergone clinical trials in the United States and Europe. Most of the efforts in the design of these new filters have been directed towards producing an effective filter that can be placed through a smaller introducer. Although accurate data in large numbers of patients are not available, the vena cava patency rate and recurrent pulmonary embolism rate for these new filters appear to be similar to those reported for the stainless steel Greenfield filter. The titanium Greenfield filter, Vena Tech filter, and Simon nitinol filter are nonferromagnetic, causing little or no artifacts on magnetic resonance images. An advantage of the bird's nest filter is that it can be placed into large venae cava, up to 40 mm in diameter. The Simon nitinol filter is delivered with a relatively flexible 7 F catheter, so it can be placed via an antecubital vein.

While there is probably no single "best" vena cava filter, many options are now available to the interventional radiologist. Percutaneous placement of inferior vena cava filters, when done by physicians skilled in fluoroscopically monitored catheter and guide wire techniques, including performance and interpretation of vena cavagrams, is a relatively safe procedure. These filters clearly have a role in preventing pulmonary embolism.

JERRY N. KING, MD
ANNA M. CHAMPLIN, MD
ROBERT N. ASHBY, MD
Albuquerque, New Mexico

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Pelvic Magnetic Resonance Imaging

ULTRASONOGRAPHY IS the established screening method for evaluating the pelvis and is often the only radiographic study needed for patients with pelvic disease. As techniques continue to be refined, however, there are now several clinical indications when magnetic resonance imaging (MRI) may give more information.

Magnetic resonance imaging has been shown to be superior to both ultrasonography and computed tomography in the staging of tumors arising from the endometrium or cervix. Recent studies have shown that administering gadolinium-labeled pentetate frequently may aid in evaluating the extent of spread of endometrial tumors and, occasionally, in the staging of more advanced cervical lesions.

Leiomyomas have a characteristic appearance on MRI, and although ultrasound can diagnose them easily, when infertility patients are to undergo myomectomy procedures, MRI can better define the number and location of leiomyomas. This enables the surgeon to have a detailed preoperative map of the lesions present. Magnetic resonance can also be used in the follow-up of patients who are receiving therapy with gonadotropin analogues for leiomyoma shrinkage.

When women present with a pelvic mass during pregnancy, MRI can be very useful in defining the nature and extent of the mass, thereby differentiating uterine leiomyomas (which can be observed during pregnancy) from adnexal masses (which may have to be removed).

Magnetic resonance imaging now is used more frequently in evaluating all types of congenital anomalies of the pelvis. Although its role in evaluating uterine (Mullerian duct) anomalies has been established for some time, it can also be used to define the abnormal anatomy present in infants with ambiguous genitalia. In neonates with anal atresia, MRI can define accurately the level of the obstruction, thereby helping to determine the type of surgical procedure that should be done and, at the same time, indicate possible associated anomalies of the kidneys and spine.

ROSALIND B. DIETRICH, MD
Orange, California

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Magnetic Resonance Angiography in the Head and Neck

MAGNETIC RESONANCE ANGIOGRAPHY (MRA) is an exciting application of magnetic resonance imaging. This technique creates a large number of thin, contiguous slices that can be viewed individually or reconstructed into a slab of images that are collapsed into a three-dimensional projection. These collapsed images allow the visualization of entire vessels. A cine loop may be obtained from a series of rotated MRA images in order to evaluate vascular anatomy rapidly. Choosing the best imaging parameters and the plane of imaging determines the success rate of this procedure.

Magnetic resonance angiography is a useful tool for evaluating patients with cerebral ischemia and stroke and for demonstrating occlusive disease in the cervicocranial, intracranial carotid, and vertebrobasilar circulations. Nearly all